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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

IN RE APPLN. OF: SMITS et al.

SERIAL NO.: 09/600,732

FILED: July 20, 2000

FOR: PROCESS FOR THE MANUFACTURE OF CHICORY INULIN . . .

GROUP: 1637

EXAMINER: SURYAPRABHA CHUNDURU DOCKET: TIENSE RAFF.26

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL LETTER
APPELLANT'S BRIEF ON APPEAL

Dear Sir:

In connection with the above-entitled matter, enclosed please find the following:

1. Three copies of Appellants' Brief on Appeal, Appendix A (Claims on Appeal), Appendix B and Appendix C; and

2. Credit Card Payment Authorization Form PTO-2038 in the amount of $330.00 to cover the cost of filing the Appeal Brief.

In the event there are any fee deficiencies or additional fees are payable, please charge them (or credit any overpayment) to our Deposit Account No. 08-1391.

Respectfully submitted,

Norman P. Soloway
Attorney for Appellants
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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: MAIL STOP APPEAL BRIEF - PATENTS, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on December 23, 2003 at Tucson, Arizona.

By _____

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APPELLANT'S BRIEF ON APPEAL

This Brief is being filed in support of Appellant's Appeal from the Final Rejection mailed July 23, 2003. A Notice of Appeal was timely filed under a Certificate of Mailing on October 23, 2003.

REAL PARTY IN INTEREST

The Real Party in Interest in this Appeal is Tiense Suikerraffinaderij N.V., a company organized under the laws of Belgium who took title by way of assignment from the inventors recorded in the USPTO on July 20, 2000 at Reel 010972, Frame 0501.

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RELATED APPEALS AND INTERFERENCES

To the best of the knowledge of the undersigned attorney and the Appellants, no other appeals or interferences exist which will affect or be directly affected, or have a bearing on the instant Appeal.

STATUS OF THE CLAIMS ON APPEAL

Claims 65-97 stand finally rejected. Claim 71 was cancelled in an after final amendment which was entered by the Examiner. Claims on Appeal are set forth in **Appendix A**.

STATUS OF AMENDMENTS

A Final Action was mailed on July 23, 2003. Appellants filed an After Final Amendment under Rule 116 in which claim 71 was cancelled, and claims 66 and 90 were amended. In an Advisory Action mailed October 20, 2003, the Examiner entered Appellants' After Final Amendment for the purposes of Appeal.

BACKGROUND OF THE INVENTION ON APPEAL

Inulin is a carbohydrate which occurs in many plants and which can be produced by certain bacteria. Inulin from plant origin consists of a polydisperse composition of chains of oligo- and polysaccharides which are composed of fructose units linked to each other through β(2-1) fructosyl-fructose linkages, and which mostly terminate in one glucose unit. Inulin from plant origin is usually composed of linear chains, but may also contain some branched chains.

A main plant source for inulin are the roots of Chicory (Cichorium intybus) and tubers from Dahlia and Jerusalem artichoke in which inulin can be present, respectively, in

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concentrations of about 15 - 18%, 12% and 14 to 18%, respectively, on fresh weight. Inulin can be readily extracted from these plant parts, purified and optionally fractioned to remove impurities, mono- and disaccharides and undesired oligosaccharides, in order to provide various grades of inulin. (Specification page 1, lines 12-25).

Chicory is conventionally cultivated in certain northern parts of Western Europe, where it is seeded in Spring (usually in April) and the roots are harvested, stored and processed for inulin production late Autumn, usually from about mid September to about the end of November, yielding through conventional manufacturing techniques standard grade chicory inulin with a mean average degree of polymerisation ($\overline{DP}$) of about 10. The whole growing and processing period typically covers about 150 to about 230 days. It is known that the degree of polymerisation (DP) and the average degree of polymerisation ($\overline{DP}$) of the inulin, as well as the content of inulin in the chicory roots (i.e. the % by weight of inulin in the fresh root material) increase during the growing season to reach a maximum after about 150 days of growing, whereas the biomass of the roots and thus the yield (in ton/ha) of inulin increase until about the end of the growing season. The end of the growing season is the time when the biomass of the roots ceases to increase significantly (i.e. typically after about 180 to about 200 days of growing), which usually corresponds to the end of October. Towards the end of the growing season, the degree of polymerisation (DP) and the average degree of polymerisation ($\overline{DP}$) of the inulin in roots remaining in the soil, as well as in harvested and stored roots, begin to decrease with time, and the rate of decrease usually significantly increases from about the beginning of November. This characteristic considerably limits the periods for growing (including seeding

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and growing) and for processing, including harvesting (harvesting period and harvesting as such), storage, and processing as such, of the chicory roots for the production of inulin, hydrolysates and derivatives of inulin in a technically and economically attractive manner.

Consequently, in spite of the fact that the manufacture of inulin from chicory roots constitutes the most important route to inulin, such manufacture is nevertheless confronted with considerable hurdles and problems, including: (i) a limited time period, including limitations in duration of the period as well as in time period of the year, during which chicory roots can be seeded, grown, harvested, stored and processed for the manufacture of inulin in a technically and economically attractive manner and/or without undergoing a significant decrease of the ($\overline{DP}$) of the inulin in the roots, (ii) a rather low mean ($\overline{DP}$) of standard grade chicory inulin (which has a ($\overline{DP}$) of about 10), (iii) a need to include a fractionation step in the manufacturing process of chicory inulin when, e.g. for technological or nutritional reasons, inulin is required with a ($\overline{DP}$) which is higher than the ($\overline{DP}$) of about 10 of known standard chicory inulin, (iv) the rather poor yields of known fractionation processes leading to inulin with a higher ($\overline{DP}$) when chicory inulin of standard grade (with a mean ($\overline{DP}$) of about 10) is used as the source inulin, and (v) the economical unattractive situation of the plants for the processing of the chicory roots. These processing plants are commonly operated during only a few months a year and are sized to process a large quantity of chicory roots in a very limited period. The processing as such of the roots for the manufacture of inulin, or of an intermediate as mentioned above, commonly takes about a day, whereas the processing period, including the harvesting (harvesting period and

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harvesting as such), storage and processing as such, of the roots, commonly lasts about 60 to about 90 days. (Specification page 8, line 20 - page 9, line 31).

SUMMARY OF THE INVENTION ON APPEAL

The present invention provides a process for the manufacture of chicory inulin from chicory roots in which the chicory roots forming the source material have been seeded, grown and processed under selected climatological temperature conditions that fall partially or wholly outside conventional growing and processing periods. (Specification page 9, line 35 to page 10, line 2 and page 11, lines 32-36).

By selected climatological temperature conditions are meant conditions which are such that the fructose exohydrolase (FEH) gene in chicory roots is not triggered by the occurrence of low temperature conditions as discussed above. (Specification page 12, lines 9-11).

More particularly, the present invention provides a process for the manufacture of chicory inulin from chicory roots through conventional post-harvesting manufacturing techniques, wherein the source material for the process are roots from chicory grown in appropriate regions and which have been grown and processed under certain selected climatological temperature conditions which are such that during a period of at least from the beginning of the third month of the growing period till the end of the processing of the chicory roots the FEH gene in the chicory roots has not been triggered (i.e. not triggered at all or not triggered to a significant extend) by the occurrence of low temperature conditions, the chicory roots have had a growing period of at least 150 days, preferably at least 160 days, more preferably about 180 days, and wherein the chicory has been seeded in the northern hemisphere

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within a time period selected from the time periods ranging from December 1 till March 14, from May 15 till May 31, and from June 1, preferably from June 15, till November 30, provided that when the chicory has been seeded in the period from May 15 till May 31, or from June 1 till June 14, the chicory roots have had a growing period of at least 180 days, or in the southern hemisphere within a time period selected from the time periods ranging from June 1 till September 14, from September 15 till September 30, from October 1 till November 14, from November 15 till November 30, and from December 1, preferably from December 15 till May 31. (Specification page 12, line 15 to page 13, line 2).

In other words, the invention on appeal is based in part on the discovery that under certain selected climatological temperature conditions, chicory roots can be grown and processed into inulin, including a growing period of the chicory of at least 160 days, preferably about 180 days, and a processing period of the roots of at least 60 days, preferably about 90 days, without occurrence of considerable inulin chain degradation in the roots, and that from chicory roots grown and processed under these selected climatological temperature conditions, improved standard grade chicory inulin, can be obtained through conventional manufacturing techniques, without fractionation, with a mean ($\overline{DP}$) taken over a processing period of at least 60 days, preferably 90 days, which is at least 20% higher, usually from 30 to 50% higher, and typically about 40% higher, than the mean ($\overline{DP}$) taken over a corresponding processing period of known standard grade chicory inulin. (Specification page 13, line 26 to page 14, line 2).

Thus while known standard grade inulin commonly has a mean ($\overline{DP}$) (over a processing period of at least 60 days) of about 10, improved standard grade inulin from chicory roots grown

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and processed under selected climatological conditions of the present claimed invention has a mean ($\overline{DP}$) (over a processing period of at least 60 days), of at least 12, usually from 13 to 16, and typically of at least 14. (Specification page 14, lines 19-23).

In the process according to the present invention on appeal the proper climatological temperature conditions are such that during the concerned time period immediately preceding the end of processing of the chicory roots, the temperature as measured in a temperature shelter has not dropped below minus 1° C. (Specification, page 15, lines 18-23).

ISSUES PRESENTED ON APPEAL

The issues presented on Appeal are:

(1) Whether claims 65-97 are indefinite under 35 USC § 112, second paragraph.

(2) Whether claims 65-78 and 89-97 are patentable over Yamazaki et al. (U.S. Patent 4,613,377) in view of the literature reference to Van Den Ende et al. (Plant Physilo. Vol. 149; 43-50).

(3) Whether claims 79-88 are patentable over Yamazaki et al. in view of Van Den Ende et al. and further in view of Van Loo (U.S. Patent 5,560,872).

THE FINAL ACTION

(1) In the Final Action the Examiner rejected claims 65-97 under 35 USC § 112, second paragraph as being indefinite. More particularly, claim 65 was rejected as being indefinite as including the phrase "partially or wholly falls outside conventional ones". Claim 65 was amended in an After Final Amendment, entered by the Examiner, to eliminate this phrase.

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Thus, it is believed the 112, second paragraph rejection of claim 65 and the several claims dependent thereon is no longer at issue.

(2) Claims 65-78 and 89-97 also were rejected under 35 USC § 103 as being obvious from Yamazaki et al. in view of Van Den Ende et al. The rejection cites Yamazaki et al. as teaching generally a method for processing of chicory inulin from chicory roots through conventional manufacturing techniques. The rejection acknowledges that Yamazaki et al. does not however teach the periods for seeding/growing/processing includes no triggering or production of fructan exhydrolase gene in chicory roots as required by the instant claims. However, the Examiner takes the position that the claims would be obvious based on the teachings of Van Den Ende et al. which the Examiner relies on as teaching that "seasonal changes in the biochemistry of fructan storing organs has been largely focused on the examination of changes in the stored carbohydrates. The observed changes in carbohydrate concentrations five-fold increase in fructose concentration) (sic) very well correlates with a breakdown of high DP fructans. The Examiner opines that the shift from high DP fructans from low DP fructans could be due to the action of FFT using low molecular weight carbohydrates as acceptors" (underlining added for emphasis). The Examiner then concludes "An ordinary practitioner would have been motivated to combine the method of Yamazaki et al. with the method of Van Den Ende et al. by incorporating the proper claim climatological conditions which partially or wholly falls outside conventional seeding and growing conditions in order to achieve the expected advantage of developing an approved process of preparing chicory inulin".

(3) Claims 78-88 have been rejected as obvious from Yamazaki et al. in view of Van Den Ende et al. as applied to claims 65-78 and 89-97 above, and further in view of Van Loo.

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The Examiner refers to Van Loo as teaching "a method of producing inulin free with (sic) low molecular weight polysaccharides by isolating inulin from chicory roots with hot water to obtain aqueous solution of inulin, purification of inulin followed by concentrating the inulin solution by partial removal of water". The rejection states "...it would have been prima facie obvious to a person of ordinary skill in the art at the time the invention was made, to modify a process for producing chicory roots for manufacturing inulin as taught by Yamazaki et al. with the method of growing and harvesting chicory roots as taught by Van Den Ende et al. and the method of producing polydispersed saccharides as taught by Van Loo et al. to achieve expected advantage of developing a process for manufacturing improved Grade chicory inulin from chicory roots under proper climatological temperatures...an ordinary practitioner would have been motivated to combine the method of Yamazaki et al. with the method of Van Den Ende et al. by incorporating the proper climatological conditions and production of inulin free of polydispersed saccharides in order to achieve the expected advantage of developing a method for production of improved grade inulin".

GROUPING OF CLAIMS

All of the claims on Appeal stand and fall together

THE REFERENCES

(1) Yamazaki et al.

The primary reference Yamazaki et al. discloses a process for the manufacture of a syrup of fructose or of fructose and [polydisperse] oligofructose from an aqueous inulin solution, by respectively, complete hydrolysis or partial hydrolysis of the inulin. According to Yamazaki et

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al., the aqueous inulin solution is obtained from tubers of Jerusalem artichoke or from chicory roots by extraction with hot water according to a purely conventional process (Yamazaki, col. 10, line 57 to col. 11, line 4). Furthermore, Appellants emphasize that Yamazaki et al. only discloses conventional cultivation of J. artichoke tubers and chicory roots, including harvesting late October (col. 12, lines 22-27). Thus, the process for obtaining the aqueous solution of inulin, including the source chicory roots, disclosed in Yamazaki et al. is completely conventional.

(2) Van Den Ende et al.

In Van Den Ende et al., like Yamazaki et al., chicory roots are cultivated in a conventional manner. Indeed, on p.44, Col. 1, Materials and Methods, it is indicated that chicory was sown (in, e.g., Belgium) on June 1 and that on a weekly basis from July 26, plants were uprooted and the roots were investigated for fructan analysis/degrading till December 6th. This covers a total period of 189 days. However, as indicated above, in Belgium frost occurs from the end of October. Accordingly, the chicory of Van Den Ende et al. has had a growing period free of frost (and thus without triggering of the FEH gene of about 153 days, which is far below the at least 180 days stipulated in claim 65 for chicory sown in the Northern Hemisphere from June 1 till June 14. Subsequent cold storage at +1°C and forcing at 16°C of the roots, disclosed in Van Den Ende et al., is directly related to the production of Belgian endive and clearly falls outside the scope of the present invention.

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(3) Van Loo et al.

Van Loo et al. teaches a method for preparation of inulin that is free from low molecular weight polysaccharides (oligosaccharides), starting from standard grade crude or purified inulin. There is no teaching or suggestion as to how the source material is seeded, grown or harvested.

ARGUMENTS ON APPEAL

(1) The rejection of claims 65-78 and 89-97 as obvious from Yamazaki et al. in view of Van Den Ende et al. is in error.

Before considering the specific art rejections, it should be noted that the invention on Appeal relates to biological plant systems which, by their nature are notoriously unpredictable. Indeed, perhaps the only rule in the case of complex biological systems is there are no rules, and that even a small change in growing or storage conditions may result in a significant change in the makeup of the final product.

The present claimed invention concerns natural products which are, by their nature, unpredictable. The state of the art at the time of filing of the present application was that inulin in plants, particularly chicory, was considered to degrade at the end of the growing season and during storage, and that the later in the growing season and the longer the storage period, the more the degradation. Furthermore, the art considered that exposure to significant frost damages chicory roots whether still in the field or harvested and stored. Frost damage destroys plant cell structures as a result of which the roots, when defrosted, rapidly rot with degradation of the reserve carbohydrate, inulin. Accordingly, in Northern Europe (the region where chicory is conventionally cultivated), chicory conventionally is seeded at the end of the season with frost (depending from the occurring weather conditions from about March 15 to May 14), and the

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roots are harvested, stored* and processed* (*if not sheltered from frost), preferably and mostly before the roots become exposed to frost.

The present inventors have surprisingly found that temperature conditions which trigger the FEH gene may even occur during a certain period of the growing phase, but that, in order to obtain inulin with a desired high ($\overline{DP}$) (preferably over a long processing period of at least 60 days), the FEH triggering temperature conditions may not occur during a specific period of the growing-harvesting-storage-processing period. This was clearly non-obvious in view of the prior art.

The prior art actually teaches away from seeding chicory and having chicory in a first growing phase possibly exposed to low temperature conditions. Thus, a person skilled in the art would not have any reasonable expectation of success, and would not carry out such studies. Therefore, defining the triggering conditions of the FEH encoding gene upon which the present application is non-obvious in view of the prior art.

Besides, from the prior art it was not obvious at all that chicory could be cultivated (including seeding-growing-harvesting-storing and processing) during other time periods and under other climatological temperature conditions than the ones known from the conventional cultivation of chicory.

Furthermore, as a consequence of the elucidation of the conditions which trigger the FEH activity and thus the degradation of inulin, it has become possible, according to the present claimed invention and clearly non-obvious in view of the prior art, to cultivate chicory with longer growing periods, which in turn results in increased yields of chicory roots and consequently in increased yields of inulin.

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Turning now to the art rejections, and considering first the rejection of independent claim 65 and the several claims 66-78 and 89-97 as obvious from Yamazaki et al. in view of Van Den Ende et al., Yamazaki et al. has been cited as teaching the processing of chicory inulin from chicory roots through conventional manufacturing techniques, and is acknowledged as so teaching. However, the Examiner looks to Van Den Ende et al. to supply the missing teachings.

Yamazaki et al. is completely silent regarding the possibility of cultivating chicory roots for the manufacture of inulin in periods that do not correspond to conventional ones. Yamazaki et al. does not contain any teaching about the possibility or need of cultivating and/or using such source chicory roots for the manufacture of inulin.

Appellants submit that the conventional cultivation of chicory roots, including seeding, growing and harvesting/processing, is clearly excluded from the scope of claim 65. The terms of the claim define through the combination of all the claimed features a particular requirement (seen as a whole) that clearly is not fulfilled by the conventional cultivation of chicory roots, e.g., such as taught by Yamazaki et al.

The subject invention resides in part in the use of a particular source material for the process for the manufacture of inulin, which source material has to fulfill particular requirements resulting from the combination of particular seeding periods, particular lengths of growing periods lengths of periods of harvesting /processing, and particular requirements for temperature conditions during certain, well defined growing and harvesting/processing periods.

The use of such particular source material in the process according to the present claimed invention results in considerable technical advantages, including, for example, improved grades of inulin (Description p.13, lines 10-20 and p.16, lines 6-14) as well as in inter alia an extension

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of the possible growing period and growing season with subsequent technical benefits (e.g. Description, p.24, line 33 to p.25, line 24). Thus, Yamazaki et al. cannot be said to teach or suggest the claimed invention.

In rejecting the claims as obvious from Yamazaki et al. in view of Van Den Ende et al., the Examiner acknowledges that the primary reference Yamazaki et al. fails to teach the claimed periods of seeding/growing/processing which includes no triggering or production of fructan exohydrolase gene in chicory roots (Final Action, page 4, lines 8-9). However, the Examiner takes the position that this missing teaching us supplied by Van Den Ende et al. It is submitted (1) that Van Den Ende et al. does not supply the missing teachings, and (2) that it would not be obvious to one skilled in the art to combine the method of Yamazaki et al. with the method of Van Den Ende et al. in any event.

Compared to the roots used in the process of the present invention, the chicory roots according to Van Den Ende et al. have had a too short growing period (from June 1 till end October), or when the growing period was longer (till December 6th), the roots were subjected to low temperature conditions that triggered FEH activity and resulted in significant degradation of inulin.

Van Den Ende et al. also does not disclose cultivation of chicory roots otherwise than in a conventional manner and in fact teaches away from non-conventional cultivation of chicory roots because it generically teaches that low temperature conditions should be avoided because they provoke degradation of inulin in chicory roots.

On page 5 of the Final Action, the Examiner quotes from Van Den Ende et al.:

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> "The shift from high DP fructans to low DP fructans could be due to the action of FFT using low molecular weight carbohydrates as acceptors..." (page 5, lines 7-9, as quoting from page 48, Col. 2, paragraph 2 of Van Den Ende et al.) (underlining added for emphasis).

Here Van Den Ende et al. at best speculates as to a possible effect of seasonal changes in the biochemistry of fructan storing organs. Clearly the Examiner is employing impermissible hindsight and is applying the teachings of the present invention to make out a case for obviousness. Van Den Ende et al. clearly only relates to conventional cultivation of chicory roots (for Belgian endive production) and does not disclose the possibility to grow chicory roots under other than conventional conditions. Van Den Ende et al. does not give any teaching or incentive at all to the skilled person to cultivate chicory roots (for the manufacture of inulin) otherwise than conventionally.

In the Advisory Action, the Examiner cites for the first time a printout of weather conditions for Brussels, Belgium allegedly to show that growing conditions in Belgium for the time period reported in Van Den Ende et al. did not fall below 1°C. On this basis, the Examiner concludes that the conditions under which Van Den Ende et al. performed his experiment were identical and therefore the products must have been identical. Heverlee, Belgium, which is where Van Den Ende et al. reportedly conducted their experiments is a small rural community (11,000 residents) 14 kilometers west of Brussels. Brussels, on the other hand has a population of almost a million. (**See Appendix B and C**). The Examiner has failed to establish prima facie that the temperature conditions in Heverlee, a small rural community would be the same as the temperature conditions within the metropolitan city or Brussels. Indeed, this Board can take judicial notice that temperatures in the metropolitan city of Brussels were not the same as in the

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outlying area of Heverlee, and likely were higher due to mass of buildings, roadways and heat generating sources.

In rejecting Applicant's claims the Examiner relies on In re Cruciferous Sprout Litigation 64 USPQ 2d 1202 (CAFC 2002) for the proposition that the temperature conditions specified in Appellants' claims were taught by Van Den Ende et al. It is submitted that there is nothing in the record that teaches the temperature conditions (in Heverlee) under which Van Den Ende et al. ran their tests were the same as the claimed temperature conditions within Brussels. Indeed, Appellants submit that the reported temperature conditions within Brussels were not the same in Heverlee. Thus, the resulting product would not be the same. Accordingly, the Examiner's reliance on In re Cruciferous Sprout Litigation is misplaced.

Furthermore, Appellants emphasize that the present claimed invention is not directed to the result of a mere routine optimization of conventional process parameters/conditions. Rather, the present claimed invention relates to non-conventional process parameters/conditions, namely parameters/conditions which are not (implicitly) covered by conventional process parameters/conditions, and in fact are contraindicated by the conventional art. Accordingly, routine optimization of conventional process parameters/conditions could not lead to the process parameters/conditions of the present invention since the conventional prior art would teach against the claimed process conditions.

Moreover, there are numerous other differences not considered by the Examiner. For one, Van Den Ende et al. teaches that towards the end of the growing season SST activity decreases and even stops, which concurs with a decrease and even a cessation of root growth and the inulin synthesis (no new kestose is synthesized). Van Den Ende et al. also teaches that

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towards the end of the growing season and particularly from October 15 onwards (period wherein low temperature conditions/frost occur), inulinase activity appears and sharply increases with time, which results in a rapidly breakdown of inulin, particularly of high DP inulin molecules with formation of fructose and low DP inulin molecules (see e.g. Van Den Ende et al., Summary; see also the paragraph beginning in the middle of the right hand column on p. 47; see also the first and fourth full paragraphs on page 48). Van Den Ende et al. attributes such inulinase activity to the activity of the FEH enzyme, but also to the possible inulinase activity of the FFT enzyme:

> "However, the observed shift from high DP fructans to lower DP fructans could also be (partly) due to the action of FFT using low molecular weight carbohydrates as acceptors."

However, irrespective of the enzyme or enzymes and the mechanism responsible for the decrease of the inulin content and of the DP of the inulin molecules in chicory roots at the end of the growing season, Van Den Ende et al. specifically and unambiguously teaches that low temperature conditions/frost are unfavorable for inulin synthesis in chicory roots and that such conditions activate inulinase activity which results in a cessation of inulin synthesis and even in a considerable breakdown of inulin. Thus, Van Den Ende et al. merely confirms by an academic study of enzyme activities, Appellants' acknowledged prior art (see Description p.8, line 20 to p. 9, line 2), that low temperature/frost conditions which occur at the end of the conventional growing season have an undesirable, inulin degrading effect on chicory roots.

Thus, Van Den Ende et al. does not contain any teaching at all that chicory roots for inulin production may appropriately be seeded, grown and processed under conditions where low temperature conditions/frost can occur. In fact, Van Den Ende et al. teaches that low temperature

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conditions are to be avoided for the cultivation of chicory roots. Conventional chicory cultivation and in particular Van Den Ende et al. thus clearly teach away from seeding /growing chicory under conditions where frost may occur.

Accordingly, the present claimed invention according to which chicory roots source material is seeded /grown/ processed under such conditions that at a certain stage of the seeding/growing period low temperature conditions/frost may occur without causing considerable negative effects (1) on the growth of the chicory roots, or (2) on the inulin synthesis in said chicory roots, or (3) on the final inulin concentration, or (4) on its DP in said roots, is clearly unexpected in view of Van Den Ende et al.

Since Van Den Ende et al. teaches that low temperature conditions/frost during the growth period lead to rapid and considerable inulin breakdown, Van Den Ende et al. clearly does not provide any teaching or suggestion to one skilled in the art to consider growing chicory roots for the manufacture of inulin under such conditions that during the growing period low temperature conditions/frost may occur.

Summarizing to this point, and with specific regard to the disclosure of Van Den Ende et al.:

(1) It was unknown at the filing date of the present patent application whether or not low temperature conditions/frost at the seeding/early stage of the growing period of chicory would impair, or even permanently block SST activity and thus impair or block root growth and inulin synthesis;

(2) It was unknown at the filing date of the present patent application whether or not low temperature conditions/frost at the seeding/early stage of the growing period of chicory would

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trigger inulinase activity (e.g. from FEH and/or FFT and/or any other inulinase) which may result in the presence of a significant inulinase activity in the chicory roots from the early growing period onwards, and result in a strong breakdown effect on inulin molecules already present in the roots;

(3) It was unknown at the filing date of the present patent application whether once inulinase activity was generated or activated in an early stage of the growing period, such inulinase activity would or would not remain active during the further growing period of the roots and accordingly have a baleful effect on inulin synthesis and inulin DP in the chicory roots during the further growing period; and

(4) One skilled in the art, and with the teaching of Van Den Ende et al., could not foresee with a reasonable expectation of success that chicory roots suitable for use as an adequate source material (i.e. with a normal yield of roots and that present a normal content of inulin of normal DP) in the process for the manufacture of inulin according to the present claimed invention, could be seeded/grown partially or wholly outside the conventional period as indicated in Appellants' claims.

(5) The Examiner has not shown prima facie that the temperature conditions under which Van Den Ende et al. conducted their experiments fall within the scope of the claims on Appeal.

Accordingly, the determination of the well-delimited period during which low temperature conditions are allowable according to the present invention is thus not an optimization of conventional conditions, as erroneously indicated by the examiner, but, contrarily, constitutes new, non-conventional process parameters and conditions.

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Having regard to the above, Appellants submit that the subject matter of the present invention is thus clearly unexpected in view of the teaching of Van Den Ende et al. Therefore, the claimed invention has to be considered non-obvious in view of Van Den Ende et al. Accordingly, no combination of Yamazaki et al. and Van Den Ende et al. could achieve the claimed invention, and the skilled person would have no incentive in Yamazaki et al. in combination with Van Den Ende et al. to examine a possible substitution of chicory roots source material that has been conventionally cultivated by non-conventionally cultivated chicory roots source material. The possibility to obtain non-conventionally cultivated chicory roots source material was unknown and unexpected at the filing date of the subject patent application. There was no teaching to the skilled person that said substitution was possible with a reasonable expectation of success. Thus, the Examiner's rejection of the claimed process or its source material as being obvious from Yamazaki et al. in view of Van Den Ende et al. clearly is not taught by the prior art, and is based on hindsight.

Since neither reference teaches the claimed invention, and in fact, teaches against the claimed invention, no combination of Yamasaki et al. and Van Den Ende et al. reasonably could be said to achieve or render obvious the invention as defined by claim 65, or the several claims 66-78 which are dependent directly or indirectly thereon. Thus, the rejection of claim 65 and the several claims 66-78 which depend directly or indirectly on claim 65 is in error.

Claim 89 and the several claims 90-92 which depend directly or indirectly thereon are directed to a process for the manufacture of a partial hydrolysate of chicory inulin, using as a source material chicory roots grown and processed under the conditions defined in claim 65. Claim 93 and claims 94-96 which depend thereon are directed to a process for the manufacture

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of a complete hydrolysate of chicory inulin similarly using as the source material chicory roots grown or processed under the conditions of claim 65. Finally, claim 97 is directed to a process for the manufacture of a derivative of chicory inulin using as the source material chicory roots grown or processed under the conditions defined in claim 65. Since the growing and processing conditions as defined in claim 65 are not taught by the combination of Yamazaki et al. and Van Den Ende et al. as discussed above at length, claims 89-97 also cannot be said to be obvious from Yamazaki et al. and Van Den Ende et al., and the rejection of claims 89-97 is likewise in error.

(2) The rejection of claims 79-88 as obvious from Yamazaki et al. in view of Van Den Ende et al. and further in view of Van Loo is in error.

Claim 79 and the several claims 80-88, which depend directly or indirectly thereon are all directed to a process for the manufacture of high performance grade chicory inulin as defined in the claim using as the source material chicory roots grown and processed under the conditions defined in claim 65. The deficiencies of the combination of Yamazaki et al. and Van Den Ende et al. vis-à-vis claim 65 are discussed above and are incorporated herein by reference.

The Van Loo et al. secondary reference does not supply the missing teachings to Yamazaki et al. and Van Den Ende et al. to achieve or render obvious Appellants' claims. Van Loo et al., which is a prior patent of Smits, one of the named inventors of the subject application, merely relates to inulin that is free of low molecular weight polysaccharides (oligosaccharides) and to a method for the preparation of same. Having regard to the technical problem underlying the present invention, and the technical solution disclosed and claimed in the present patent application, Van Loo et al. merely concerns a preparation of a particular grade of inulin by

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means of a particular process, that starts from standard grade crude or purified inulin! In the present application, claims 79-88 all require a particular source material, i.e., chicory roots grown and processed under the unconventional conditions specified by claim 65. Thus, the rejection of claims 79-88 as obvious from Yamazaki et al. and Van Den Ende et al. in view of Van Loo et al. also is in error.

SUMMARY AND CONCLUSIONS

The prior art in general, and applied prior art references in particular, neither teach nor suggest which enzyme is mainly responsible for the degradation of inulin in chicory roots at the end of the growing season and during storage and processing to inulin, nor even more importantly what conditions trigger the production of the enzyme and/or the pronounced FEH activity of the enzyme. The applied prior art also neither teaches nor suggests any possibility nor any means of excluding the triggering of the production and/or the activity of said FEH enzyme. Thus, no combination of the applied art could achieve or render obvious the claimed invention.

In view of the prior art, it was also clearly non-obvious to obtain by the process of the present invention inulin with a higher mean ($\overline{DP}$) over a long (at least 60 days) storage and processing period than the one of conventional inulin. Indeed, the prior art teaches away from the claimed invention in this respect, because prior to the present invention, the conventional wisdom of the state of the art was that at the end of the growing period, the ($\overline{DP}$) drops and that thus the chicory roots have to be processed as soon as possible.

Furthermore, considering the long felt need for industrial quantities of inulin product with an improved ($\overline{DP}$) and considering the long period the industry has already had, and failed, to

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solve this need by means including complicated processing methods as well as biotechnological techniques, it is respectfully submitted that the present claimed invention is non-obvious, and that the rejection of the claims is in error.

In view of the foregoing, it is respectfully requested that the Examiner's Rejection of the subject Application be reversed in all respects.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: MAIL STOP APPEAL BRIEF - PATENTS, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on December 23, 2003, at Tucson, Arizona.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

IN RE APPLN. OF: SMITS et al.

SERIAL NO.: 09/600,732

FILED: July 20, 2000

FOR: PROCESS FOR THE MANUFACTURE OF CHICORY. . .

GROUP: 1637

EXAMINER: SURYAPRABHA CHUNDURU DOCKET: TIENSE RAFF.26

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APPELLANTS' BRIEF ON APPEAL

APPENDIX A

(Claims on Appeal)

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APPENDIX A

CLAIMS ON APPEAL

Claim 65: In a process for the manufacture of chicory inulin from chicory roots through conventional manufacturing techniques, the improvement which comprises:

- using as a source material for the process roots of chicory which have been grown in appropriate regions and have been seeded, grown and processed under climatological temperature conditions which are such that during a period of at least from the beginning of the third month of the growing period till the end of the processing of the chicory roots the fructan exohydrolase (FEH) gene in the chicory roots has not been triggered by the occurrence of low temperature conditions which are such that the temperature in a thermometer shelter shall not have dropped below minus 1°C,
- said chicory roots have had a growing period of at least 150 days,
- said chicory has been seeded
    - in the northern hemisphere within a period selected from the periods ranging from December 1 till March 14, from March 15 till May 14, from May 15 till May 31, from June 1 till June 14, and from June 15 till November 30, provided that when said chicory has been seeded in the periods from May 15 till May 31, and from June 1 till June 14, the chicory roots have had a growing period of at least 180 days, and provided that when said chicory has been seeded in the period from March 15 till May 14, the chicory roots have been grown and processed under climatological conditions wherein, within a period of at least 220 consecutive days immediately preceding the end of the processing of the roots, no low temperature

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conditions occurred which triggered the FEH gene, and the chicory roots have had a minimum growing period of at least 160 days,

- in the southern hemisphere within a period selected from the periods ranging from June 1 till September 14, from September 15 till September 30, from October 1 till November 14, from November 15 till November 30, and from December 1 till May 31.

Claim 66: In a process according to claim 65, the improvement wherein the chicory has had a growing period of at least 180 days.

Claim 67: In a process according to claim 65, the improvement wherein the chicory has been seeded in the northern hemisphere.

Claim 68: In a process according to claim 65, the improvement wherein the roots of chicory have been grown and processed under climatological temperature conditions wherein, within a period of at least 220 consecutive days immediately preceding the end of the processing of the roots, no low temperature conditions occurred which triggered the FEH gene in chicory roots, said roots have had a growing period of at least 160 days, and the inulin obtained is improved standard grade chicory inulin with a mean average degree of polymerization ($\overline{DP}$) taken over a processing period of at least 60 days, which is at least 12.

Claim 69: In a process according to claim 68, the improvement wherein no low temperature conditions which trigger the FEH gene in chicory roots occur within a total period of at least 240 consecutive days and the chicory has had a growing period of at least 180 days.

Claim 70: In a process according to claim 69, the improvement wherein the chicory has been seeded in the northern hemisphere within a period selected from the periods ranging from December 1 till March 14, from March 15 till May 14, from May 15 till May 31, and from June

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1 till November 30, or in the southern hemisphere within a period selected from the periods ranging from June 1 till September 14, from September 15 till November 14, from November 15 till November 30, and from December 1 till May 31.

Claim 71: (Cancelled - After Final Amendment)

Claim 72: In a process according to claim 65, the improvement wherein said appropriate regions comprise the Californian region of the USA.

Claim 73: In a process according to claim 65, the improvement wherein the source material are chicory roots which have been grown and processed under the conditions as defined in claim 65, said process further comprising the steps of:

(i) isolation of the inulin from the chicory roots yielding an aqueous solution of crude inulin,

(ii) purification of the crude inulin obtained in step (i) yielding an aqueous solution of purified inulin, optionally followed by concentration of this solution by partial removal of the water yielding a purified inulin concentrate, and

(iii) isolation in particulate form of the inulin from the aqueous solution or concentrate of purified inulin obtained in step (ii), thereby yielding, respectively, standard grade chicory inulin or improved standard grade chicory inulin.

Claim 74: In a process according to claim 73, the improvement comprising:

- for step (i): extraction with hot water of the inulin from fresh slices or shreds of the chicory roots, yielding an aqueous solution of crude inulin,
- for step (ii): purification of the aqueous solution of crude inulin obtained in step (i) by depuration followed by refining, and

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- for step (iii): isolation of, respectively, standard grade chicory inulin or improved standard grade chicory inulin, in particulate form by spray drying.

Claim 75: In a process according to claim 65, for the manufacture of low sugar standard grade chicory inulin or improved low sugar standard grade chicory inulin containing in total less than 1 weight % monomeric saccharides and sucrose, by conventional techniques from chicory roots, the improvement wherein the source material are chicory roots which have been grown and processed under the conditions as defined in claim 65.

Claim 76: In a process according to claim 75, the improvement wherein, respectively, standard grade chicory inulin or improved standard grade chicory inulin or a corresponding intermediate purified inulin, obtained by a process defined in claim 65 is used as a source material and is, in accordance with known techniques, subjected to the following additional consecutive steps:

(iv) removal of the monomeric saccharides and sucrose, yielding a low sugar inulin solution or concentrate, and

(v) isolating the low sugar inulin in particulate form from the solution or concentrate obtained in step (iv),

and the product obtained is, respectively, low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 10 or improved low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 12, the mean ($\overline{DP}$) being taken over a processing period of at least 60 days.

Claim 77: In a process according to claim 75, the improvement wherein, respectively, standard grade chicory inulin or improved standard grade chicory inulin or a corresponding

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intermediate purified inulin, obtained by a process defined in claim 68 is used as a source material and is, in accordance with known techniques, subjected to the following additional consecutive steps:

(iv) removal of the monomeric saccharides and sucrose, yielding a low sugar inulin solution or concentrate, and

(v) isolating the low sugar inulin in particulate form from the solution or concentrate obtained in step (iv),

and the product obtained is, respectively, low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 10 or improved low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 12, the mean ($\overline{DP}$) being taken over a processing period of at least 60 days.

Claim 78: In a process according to claim 75, the improvement wherein, respectively, standard grade chicory inulin or improved standard grade chicory inulin or a corresponding intermediate purified inulin, obtained by a process defined in claim 74 is used as a source material and is, in accordance with known techniques, subjected to the following additional consecutive steps:

(iv) removal of the monomeric saccharides and sucrose, yielding a low sugar inulin solution or concentrate, and

(v) isolating the low sugar inulin in particulate form from the solution or concentrate obtained in step (iv),

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and the product obtained is, respectively, low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 10 or improved low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 12, the mean ($\overline{DP}$) being taken over a processing period of at least 60 days.

Claim 79: In a process according to claim 65, for the manufacture of high performance grade chicory inulin with a ($\overline{DP}$) of at least 20, or improved high performance grade chicory inulin with a mean ($\overline{DP}$), taken over a processing period of the chicory roots of at least 60 days, of at least 20, which are essentially free from low molecular monomeric saccharides, dimeric saccharides and oligofructose, and essentially free from colorings, salts, proteins, organic acids and technological aids, the improvement wherein the source material are chicory roots which have been grown and processed under the conditions as defined in claim 65.

Claim 80: In a process according to claim 79, the improvement wherein standard grade chicory inulin with a ($\overline{DP}$) of at least 12, respectively improved standard grade chicory inulin with a mean ($\overline{DP}$), taken over a processing period of the chicory roots of at least 60 days, of at least 12, or its intermediate, depurated or refined inulin, obtained by a process defined in claim 65, is used as a source material and subjected, in accordance with known techniques, to the following consecutive steps:

(vi) fractionation, and

(vii) isolation in particulate form of the high performance grade inulin from the fractionated product obtained in step (vi),

thereby providing high performance grade chicory inulin, respectively improved high performance grade chicory inulin in a yield of at least 40% based on the source inulin.

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Claim 81: In a process according to claim 80, the improvement wherein standard grade chicory inulin with a ($\overline{DP}$) of at least 12, respectively improved standard grade chicory inulin with a mean ($\overline{DP}$), taken over a processing period of the chicory roots of at least 60 days, of at least 12, or its intermediate, depurated or refined inulin, obtained by a process defined in claim 73, is used as a source material and subjected, in accordance with known techniques, to the following consecutive steps:

(vi) fractionation, and

(vii) isolation in particulate form of the high performance grade inulin from the fractionated product obtained in step (vi),

thereby providing high performance grade chicory inulin, respectively improved high performance grade chicory inulin in a yield of at least 40% based on the source inulin.

Claim 82: In a process according to claim 80, the improvement wherein standard grade chicory inulin with a ($\overline{DP}$) of at least 12, respectively improved standard grade chicory inulin with a mean ($\overline{DP}$), taken over a processing period of the chicory roots of at least 60 days, of at least 12, or its intermediate, depurated or refined inulin, obtained by a process defined in claim 74, is used as a source material and subjected, in accordance with known techniques, to the following consecutive steps:

(vi) fractionation, and

(vii) isolation in particulate form of the high performance grade inulin from the fractionated product obtained in step (vi),

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thereby providing high performance grade chicory inulin, respectively improved high performance grade chicory inulin in a yield of at least 40% based on the source inulin.

Claim 83: In a process according to claim 80, the improvement wherein the fractionation is carried out by directed crystallization of an aqueous metastable solution of the source material, and the isolation of the fractionated inulin in particulate form is carried out by filtration or centrifuging including washing with water.

Claim 84: In a process according to claim 81, the improvement wherein the fractionation is carried out by directed crystallization of an aqueous metastable solution of the source material, and the isolation of the fractionated inulin in particulate form is carried out by filtration or centrifuging including washing with water.

Claim 85: In a process according to claim 82, the improvement wherein the fractionation is carried out by directed crystallization of an aqueous metastable solution of the source material, and the isolation of the fractionated inulin in particulate form is carried out by filtration or centrifuging including washing with water.

Claim 86: In a process according to claim 80, the improvement wherein the source inulin has a ($\overline{DP}$), respectively a mean ($\overline{DP}$) of at least 14, and the high performance grade chicory inulin, respectively improved high performance grade chicory inulin, is obtained in a yield of at least 45% based on the source material, and has a ($\overline{DP}$), respectively a mean ($\overline{DP}$), of at least 20, the mean ($\overline{DP}$) being taken over a processing period of the source chicory roots of at least 60 days.

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Claim 87: In a process according to claim 81, the improvement wherein the source inulin has a ($\overline{DP}$), respectively a mean ($\overline{DP}$) of at least 14, and the high performance grade chicory inulin, respectively improved high performance grade chicory inulin, is obtained in a yield of at least 45% based on the source material, and has a ($\overline{DP}$), respectively a mean ($\overline{DP}$), of at least 20, the mean ($\overline{DP}$) being taken over a processing period of the source chicory roots of at least 60 days.

Claim 88: In a process according to claim 82, the improvement wherein the source inulin has a ($\overline{DP}$), respectively a mean ($\overline{DP}$) of at least 14, and the high performance grade chicory inulin, respectively improved high performance grade chicory inulin, is obtained in a yield of at least 45% based on the source material, and has a ($\overline{DP}$), respectively a mean ($\overline{DP}$), of at least 20, the mean ($\overline{DP}$) being taken over a processing period of the source chicory roots of at least 60 days.

Claim 89: In a process for the manufacture of a partial hydrolysate of chicory inulin, by conventional techniques from chicory roots, the improvement wherein the source material are chicory roots which have been grown and processed under the conditions as defined in claim 65 and the product obtained is polydisperse oligofructose.

Claim 90: In a process according to claim 89, the improvement wherein respectively, standard grade or improved standard grade chicory inulin or the corresponding intermediates, depurated or refined inulin, obtained by a process defined in claim 65, is used as a source material, and the product obtained is polydisperse oligofructose containing at least 90% by weight dry substance and the oligofructose has a degree of polymerization (*DP*) from 2 to 10.

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Claim 91: In a process according to claim 90, the improvement wherein respectively, standard grade or improved standard grade chicory inulin or the corresponding intermediates, depurated or refined inulin, obtained by a process defined in claim 73, is used as a source material, and the product obtained is polydisperse oligofructose containing at least 90% by weight dry substance and the oligofructose has a (*DP*) from 2 to 10.

Claim 92: In a process according to claim 90, the improvement wherein respectively, standard grade or improved standard grade chicory inulin or the corresponding intermediates, depurated or refined inulin, obtained by a process defined in claim 74, is used as a source material, and the product obtained is polydisperse oligofructose containing at least 90% by weight dry substance and the oligofructose has a (*DP*) from 2 to 10.

Claim 93: In a process for the manufacture of a complete hydrolysate of chicory inulin, by conventional techniques from chicory roots, the improvement wherein the source material are chicory roots which have been grown and processed under the conditions as defined in claim 65, and the product obtained is fructose.

Claim 94: In a process according to claim 93, the improvement wherein, respectively, standard grade or improved standard grade inulin or the corresponding intermediate, depurated or refined inulin, obtained by a process defined in claim 65, is used as a source material, and the product obtained is fructose containing at least 89% by weight fructose, calculated on dry substance.

Claim 95: In a process according to claim 93, the improvement wherein, respectively, standard grade or improved standard grade inulin or the corresponding intermediate, depurated or refined inulin, obtained by a process defined in claim 73, is used as a source material, and

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the product obtained is fructose containing at least 89% by weight fructose, calculated on dry substance.

Claim 96: In a process according to claim 93, the improvement wherein, respectively, standard grade or improved standard grade inulin or the corresponding intermediate, depurated or refined inulin, obtained by a process defined in claim 74, is used as a source material, and the product obtained is fructose containing at least 89% by weight fructose, calculated on dry substance.

Claim 97: In a process for the manufacture of a derivative of chicory inulin, by conventional techniques from chicory inulin or an intermediate thereof, the improvement wherein the source material for the inulin are chicory roots which have been grown and processed under the conditions as defined in claim 65.

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APPELLANTS' BRIEF ON APPEAL

APPENDIX B

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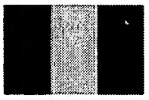
Belgium





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Belgium at a glance

(Last updated in September 2003)

Name:	Kingdom of Belgium, Koninkrijk België, Royaume de Belgique
Climate:	Temperate climate
Location:	Western Europe, bounded south-west by France, north-west by the Nor the Netherlands, east by Germany and south-east by Luxembourg
Area:	30,528 sq km (by comparison, area of North-Rhine/Westphalia: 34,078
Capital:	Brussels
Population:	10,239,085 inhabitants; 5,940,488 in the Flemish region, 3,339,279 in the Walloon region (inclu German-speaking region), 959,318 in Brussels, 872,765 foreigners; population density: 335.4 per sq km, population growth: +2.01% (200
Languages:	Flemish (approx. 6.1 million), French (approx. 4.1 million), German (approx. 0.07 million)
Religions:	Approx. 8 million Roman Catholics, 75,000 Protestants, 40,000 Orthodo approx. 400,000 Muslims, 35,000 Jews, 1.7 million not belonging to an
National Day:	21 July (coronation of the first King of the Belgians, Leopold I)
Independence:	1830
System of government:	Constitutional monarchy, parliamentary two-chamber system, federal s
Head of State:	(Succession in the House of Saxe-Coburg-Gotha) Albert II, King of the Belgians, Koning der Belgen, Roi des Belges, since 9 August 1993; Deputy: none ex officio
Head of Government:	Prime Minister Guy Verhofstadt (VLD), since 12 July 1999
Foreign Minister:	Louis Michel (PRL), since 12 July 1999
Parliament:	Based in Brussels, President: Herman De Croo (VLD), name: Chamber of Representatives (Chambre des Représentants, Kam Volksvertegenwoordigers); 150 members; last election on 18 May 2003 2007; functions: general legislation, budget, oversight of government

Senate:	Based in Brussels, President: Armand De Decker (PRL), name: Senate (Senat, Senaat), 71 members, last election (of 40 senat 2003, next election in 2007; the other members are co-opted or design councils; functions: participation in constitutional amendments, ratification of int and right of second reading; otherwise consultative
Governing parties:	Listed according to number of seats in the Chamber of Representatives 1. Vlaamse Liberalen en Demokraten (VLD - Flemish Liberals) 25 2. Parti Socialiste (PS - Francophone Socialists) 25 3. Mouvement Réformateur (MR - Francophone Liberals) 24 4. Sociaal Progressief Alternatief (SPA-Spirit - Flemish Socialists) 23
Opposition parties:	Listed according to number of seats in the Chamber of Representatives 1. Christen-Democratisch en Vlaams (CD&V - Flemish Christian Democ 2. Vlaams Blok (VB - Flemish right-wing extremists) 18 3. Centre démocratique humaniste (CDH - Francophone Christian Dem 4. Ecologistes confédérés (Ecolo - Francophone Greens) 4 5. Front National (FN - Francophone right-wing extremists) 1 6. Nieuw-Vlaamse Alliantie (N-VA) (Nationalist Flemish Language Party)
Trade unions:	Listed according to number of members in works councils: Confédération des Syndicats Chrétiens de Belgique (CSC) = Algemeen Christelijk Vakverbond van België (ACV, Christian), Fédération Générale du Travail de Belgique (FGTB) = Algemeen Belgisch Vakverbond (ABVV, socialist), Centrale Générale des Syndicats Libéraux de Belgique (CGSLB) = Algemeene Centrale der Liberale Vakbonden van België (ACLVB, liberal)
Administrative structure:	Belgium consists of the Federation and the regions of Flanders, Walloni region Brussels, and of the Flemish, French and German-language com Intermediate tier: 10 provinces with governors Lower tier: 589 local communities
Membership of international organizations:	BENELUX, BITD, EBRD, ECE, EEA, ESA, EU, EUROCONTROL, Council of ICAO, IIFC, IIT, ILO, IMCO, IMF, NATO, OAU, OECD, OSCE, UNESCO, U Bank, WEU, WHO, WMO, WTO (as a rule from the very beginning)
Principal media:	*Public radio and television*: - VRT - Vlaamse Radio en Televisie - RTBF - Radio-Télévision Belge de la Communauté Française - BRF - Belgian Broadcasting Corporation *Commercial radio and television*: - RTL-TVI (French) - VTM - Vlaamse Televisie Maatschappij (Dutch) - Kanaal 2 (Dutch) - VT 4 (Dutch) Cable companies broadcast some German programmes. *Print media*: Flemish: Het Laatste Nieuws (Brussels, national), liberal De Standaard (Brussels, national), Christian, conservative De Morgen (Brussels, national), left (intellectual) Gazet van Antwerpen (regional), Christian Het Volk (Brussels, national), Christian Democratic Het Belang van Limburg (Hasselt), Christian French: Le Soir (Brussels, national), liberal La Libre Belgique (Brussels, national), Christian, conservative Vers L'Avenir (Namur), Christian German: Grenzecho (Eupen); German, daily *Economic papers:* Flemish: Financieel Economische Tijd (Brussels, national) French: L'Echo (Brussels, national) *Magazines*:

	Flemish: Knack (Brussels, national), liberal French: Le Vif/L'Express (Brussels, national), liberal German: Belgien-Magazin (Brussels)
GDP:	EUR 264.73 billion
Per-capita GDP:	EUR 25,966

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 Publication Data

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APPELLANTS' BRIEF ON APPEAL

APPENDIX C

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Location: *Oud-Heverlee Belgium* | Category: *Belgium Cities and Towns*

Oud-Heverlee Belgium

Oud-Heverlee, a commune with 11,000 residents, is located 14 kilometers west of Brussels on the E40 roadway.

Blanden, Haasrode, Sint-Joris-Weert, and Vaalbeek are boroughs within the municipal district of Oud-Heverlee.

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Oud-Heverlee Belgium

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TABLE OF CASES

TABLE OF AUTHORITIES

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APPELLANT'S BRIEF ON APPEAL

This Brief is being filed in support of Appellant's Appeal from the Final Rejection mailed July 23, 2003. A Notice of Appeal was timely filed under a Certificate of Mailing on October 23, 2003.

REAL PARTY IN INTEREST

The Real Party in Interest in this Appeal is Tiense Suikerraffinaderij N.V., a company organized under the laws of Belgium who took title by way of assignment from the inventors recorded in the USPTO on July 20, 2000 at Reel 010972, Frame 0501.

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RELATED APPEALS AND INTERFERENCES

To the best of the knowledge of the undersigned attorney and the Appellants, no other appeals or interferences exist which will affect or be directly affected, or have a bearing on the instant Appeal.

STATUS OF THE CLAIMS ON APPEAL

Claims 65-97 stand finally rejected. Claim 71 was cancelled in an after final amendment which was entered by the Examiner. Claims on Appeal are set forth in **Appendix A**.

STATUS OF AMENDMENTS

A Final Action was mailed on July 23, 2003. Appellants filed an After Final Amendment under Rule 116 in which claim 71 was cancelled, and claims 66 and 90 were amended. In an Advisory Action mailed October 20, 2003, the Examiner entered Appellants' After Final Amendment for the purposes of Appeal.

BACKGROUND OF THE INVENTION ON APPEAL

Inulin is a carbohydrate which occurs in many plants and which can be produced by certain bacteria. Inulin from plant origin consists of a polydisperse composition of chains of oligo- and polysaccharides which are composed of fructose units linked to each other through β(2-1) fructosyl-fructose linkages, and which mostly terminate in one glucose unit. Inulin from plant origin is usually composed of linear chains, but may also contain some branched chains.

A main plant source for inulin are the roots of Chicory (Cichorium intybus) and tubers from Dahlia and Jerusalem artichoke in which inulin can be present, respectively, in

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concentrations of about 15 - 18%, 12% and 14 to 18%, respectively, on fresh weight. Inulin can be readily extracted from these plant parts, purified and optionally fractioned to remove impurities, mono- and disaccharides and undesired oligosaccharides, in order to provide various grades of inulin. (Specification page 1, lines 12-25).

Chicory is conventionally cultivated in certain northern parts of Western Europe, where it is seeded in Spring (usually in April) and the roots are harvested, stored and processed for inulin production late Autumn, usually from about mid September to about the end of November, yielding through conventional manufacturing techniques standard grade chicory inulin with a mean average degree of polymerisation ($\overline{DP}$) of about 10. The whole growing and processing period typically covers about 150 to about 230 days. It is known that the degree of polymerisation (DP) and the average degree of polymerisation ($\overline{DP}$) of the inulin, as well as the content of inulin in the chicory roots (i.e. the % by weight of inulin in the fresh root material) increase during the growing season to reach a maximum after about 150 days of growing, whereas the biomass of the roots and thus the yield (in ton/ha) of inulin increase until about the end of the growing season. The end of the growing season is the time when the biomass of the roots ceases to increase significantly (i.e. typically after about 180 to about 200 days of growing), which usually corresponds to the end of October. Towards the end of the growing season, the degree of polymerisation (DP) and the average degree of polymerisation ($\overline{DP}$) of the inulin in roots remaining in the soil, as well as in harvested and stored roots, begin to decrease with time, and the rate of decrease usually significantly increases from about the beginning of November. This characteristic considerably limits the periods for growing (including seeding

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and growing) and for processing, including harvesting (harvesting period and harvesting as such), storage, and processing as such, of the chicory roots for the production of inulin, hydrolysates and derivatives of inulin in a technically and economically attractive manner.

Consequently, in spite of the fact that the manufacture of inulin from chicory roots constitutes the most important route to inulin, such manufacture is nevertheless confronted with considerable hurdles and problems, including: (i) a limited time period, including limitations in duration of the period as well as in time period of the year, during which chicory roots can be seeded, grown, harvested, stored and processed for the manufacture of inulin in a technically and economically attractive manner and/or without undergoing a significant decrease of the ($\overline{DP}$) of the inulin in the roots, (ii) a rather low mean ($\overline{DP}$) of standard grade chicory inulin (which has a ($\overline{DP}$) of about 10), (iii) a need to include a fractionation step in the manufacturing process of chicory inulin when, e.g. for technological or nutritional reasons, inulin is required with a ($\overline{DP}$) which is higher than the ($\overline{DP}$) of about 10 of known standard chicory inulin, (iv) the rather poor yields of known fractionation processes leading to inulin with a higher ($\overline{DP}$) when chicory inulin of standard grade (with a mean ($\overline{DP}$) of about 10) is used as the source inulin, and (v) the economical unattractive situation of the plants for the processing of the chicory roots. These processing plants are commonly operated during only a few months a year and are sized to process a large quantity of chicory roots in a very limited period. The processing as such of the roots for the manufacture of inulin, or of an intermediate as mentioned above, commonly takes about a day, whereas the processing period, including the harvesting (harvesting period and

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harvesting as such), storage and processing as such, of the roots, commonly lasts about 60 to about 90 days. (Specification page 8, line 20 - page 9, line 31).

SUMMARY OF THE INVENTION ON APPEAL

The present invention provides a process for the manufacture of chicory inulin from chicory roots in which the chicory roots forming the source material have been seeded, grown and processed under selected climatological temperature conditions that fall partially or wholly outside conventional growing and processing periods. (Specification page 9, line 35 to page 10, line 2 and page 11, lines 32-36).

By selected climatological temperature conditions are meant conditions which are such that the fructose exohydrolase (FEH) gene in chicory roots is not triggered by the occurrence of low temperature conditions as discussed above. (Specification page 12, lines 9-11).

More particularly, the present invention provides a process for the manufacture of chicory inulin from chicory roots through conventional post-harvesting manufacturing techniques, wherein the source material for the process are roots from chicory grown in appropriate regions and which have been grown and processed under certain selected climatological temperature conditions which are such that during a period of at least from the beginning of the third month of the growing period till the end of the processing of the chicory roots the FEH gene in the chicory roots has not been triggered (i.e. not triggered at all or not triggered to a significant extend) by the occurrence of low temperature conditions, the chicory roots have had a growing period of at least 150 days, preferably at least 160 days, more preferably about 180 days, and wherein the chicory has been seeded in the northern hemisphere

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within a time period selected from the time periods ranging from December 1 till March 14, from May 15 till May 31, and from June 1, preferably from June 15, till November 30, provided that when the chicory has been seeded in the period from May 15 till May 31, or from June 1 till June 14, the chicory roots have had a growing period of at least 180 days, or in the southern hemisphere within a time period selected from the time periods ranging from June 1 till September 14, from September 15 till September 30, from October 1 till November 14, from November 15 till November 30, and from December 1, preferably from December 15 till May 31. (Specification page 12, line 15 to page 13, line 2).

In other words, the invention on appeal is based in part on the discovery that under certain selected climatological temperature conditions, chicory roots can be grown and processed into inulin, including a growing period of the chicory of at least 160 days, preferably about 180 days, and a processing period of the roots of at least 60 days, preferably about 90 days, without occurrence of considerable inulin chain degradation in the roots, and that from chicory roots grown and processed under these selected climatological temperature conditions, improved standard grade chicory inulin, can be obtained through conventional manufacturing techniques, without fractionation, with a mean ($\overline{DP}$) taken over a processing period of at least 60 days, preferably 90 days, which is at least 20% higher, usually from 30 to 50% higher, and typically about 40% higher, than the mean ($\overline{DP}$) taken over a corresponding processing period of known standard grade chicory inulin. (Specification page 13, line 26 to page 14, line 2).

Thus while known standard grade inulin commonly has a mean ($\overline{DP}$) (over a processing period of at least 60 days) of about 10, improved standard grade inulin from chicory roots grown

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and processed under selected climatological conditions of the present claimed invention has a mean ($\overline{DP}$) (over a processing period of at least 60 days), of at least 12, usually from 13 to 16, and typically of at least 14. (Specification page 14, lines 19-23).

In the process according to the present invention on appeal the proper climatological temperature conditions are such that during the concerned time period immediately preceding the end of processing of the chicory roots, the temperature as measured in a temperature shelter has not dropped below minus 1° C. (Specification, page 15, lines 18-23).

ISSUES PRESENTED ON APPEAL

The issues presented on Appeal are:

(1) Whether claims 65-97 are indefinite under 35 USC § 112, second paragraph.

(2) Whether claims 65-78 and 89-97 are patentable over Yamazaki et al. (U.S. Patent 4,613,377) in view of the literature reference to Van Den Ende et al. (Plant Physilo. Vol. 149; 43-50).

(3) Whether claims 79-88 are patentable over Yamazaki et al. in view of Van Den Ende et al. and further in view of Van Loo (U.S. Patent 5,560,872).

THE FINAL ACTION

(1) In the Final Action the Examiner rejected claims 65-97 under 35 USC § 112, second paragraph as being indefinite. More particularly, claim 65 was rejected as being indefinite as including the phrase "partially or wholly falls outside conventional ones". Claim 65 was amended in an After Final Amendment, entered by the Examiner, to eliminate this phrase.

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Thus, it is believed the 112, second paragraph rejection of claim 65 and the several claims dependent thereon is no longer at issue.

(2) Claims 65-78 and 89-97 also were rejected under 35 USC § 103 as being obvious from Yamazaki et al. in view of Van Den Ende et al. The rejection cites Yamazaki et al. as teaching generally a method for processing of chicory inulin from chicory roots through conventional manufacturing techniques. The rejection acknowledges that Yamazaki et al. does not however teach the periods for seeding/growing/processing includes no triggering or production of fructan exhydrolase gene in chicory roots as required by the instant claims. However, the Examiner takes the position that the claims would be obvious based on the teachings of Van Den Ende et al. which the Examiner relies on as teaching that "seasonal changes in the biochemistry of fructan storing organs has been largely focused on the examination of changes in the stored carbohydrates. The observed changes in carbohydrate concentrations five-fold increase in fructose concentration) (sic) very well correlates with a breakdown of high DP fructans. The Examiner opines that the shift from high DP fructans from low DP fructans could be due to the action of FFT using low molecular weight carbohydrates as acceptors" (underlining added for emphasis). The Examiner then concludes "An ordinary practitioner would have been motivated to combine the method of Yamazaki et al. with the method of Van Den Ende et al. by incorporating the proper claim climatological conditions which partially or wholly falls outside conventional seeding and growing conditions in order to achieve the expected advantage of developing an approved process of preparing chicory inulin".

(3) Claims 78-88 have been rejected as obvious from Yamazaki et al. in view of Van Den Ende et al. as applied to claims 65-78 and 89-97 above, and further in view of Van Loo.

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The Examiner refers to Van Loo as teaching "a method of producing inulin free with (sic) low molecular weight polysaccharides by isolating inulin from chicory roots with hot water to obtain aqueous solution of inulin, purification of inulin followed by concentrating the inulin solution by partial removal of water". The rejection states "...it would have been prima facie obvious to a person of ordinary skill in the art at the time the invention was made, to modify a process for producing chicory roots for manufacturing inulin as taught by Yamazaki et al. with the method of growing and harvesting chicory roots as taught by Van Den Ende et al. and the method of producing polydispersed saccharides as taught by Van Loo et al. to achieve expected advantage of developing a process for manufacturing improved Grade chicory inulin from chicory roots under proper climatological temperatures...an ordinary practitioner would have been motivated to combine the method of Yamazaki et al. with the method of Van Den Ende et al. by incorporating the proper climatological conditions and production of inulin free of polydispersed saccharides in order to achieve the expected advantage of developing a method for production of improved grade inulin".

GROUPING OF CLAIMS

All of the claims on Appeal stand and fall together

THE REFERENCES

(1) Yamazaki et al.

The primary reference Yamazaki et al. discloses a process for the manufacture of a syrup of fructose or of fructose and [polydisperse] oligofructose from an aqueous inulin solution, by respectively, complete hydrolysis or partial hydrolysis of the inulin. According to Yamazaki et

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al., the aqueous inulin solution is obtained from tubers of Jerusalem artichoke or from chicory roots by extraction with hot water according to a purely conventional process (Yamazaki, col. 10, line 57 to col. 11, line 4). Furthermore, Appellants emphasize that Yamazaki et al. only discloses conventional cultivation of J. artichoke tubers and chicory roots, including harvesting late October (col. 12, lines 22-27). Thus, the process for obtaining the aqueous solution of inulin, including the source chicory roots, disclosed in Yamazaki et al. is completely conventional.

(2) Van Den Ende et al.

In Van Den Ende et al., like Yamazaki et al., chicory roots are cultivated in a conventional manner. Indeed, on p.44, Col. 1, Materials and Methods, it is indicated that chicory was sown (in, e.g., Belgium) on June 1 and that on a weekly basis from July 26, plants were uprooted and the roots were investigated for fructan analysis/degrading till December 6th. This covers a total period of 189 days. However, as indicated above, in Belgium frost occurs from the end of October. Accordingly, the chicory of Van Den Ende et al. has had a growing period free of frost (and thus without triggering of the FEH gene of about 153 days, which is far below the at least 180 days stipulated in claim 65 for chicory sown in the Northern Hemisphere from June 1 till June 14. Subsequent cold storage at +1°C and forcing at 16°C of the roots, disclosed in Van Den Ende et al., is directly related to the production of Belgian endive and clearly falls outside the scope of the present invention.

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(3) Van Loo et al.

Van Loo et al. teaches a method for preparation of inulin that is free from low molecular weight polysaccharides (oligosaccharides), starting from standard grade crude or purified inulin. There is no teaching or suggestion as to how the source material is seeded, grown or harvested.

ARGUMENTS ON APPEAL

(1) The rejection of claims 65-78 and 89-97 as obvious from Yamazaki et al. in view of Van Den Ende et al. is in error.

Before considering the specific art rejections, it should be noted that the invention on Appeal relates to biological plant systems which, by their nature are notoriously unpredictable. Indeed, perhaps the only rule in the case of complex biological systems is there are no rules, and that even a small change in growing or storage conditions may result in a significant change in the makeup of the final product.

The present claimed invention concerns natural products which are, by their nature, unpredictable. The state of the art at the time of filing of the present application was that inulin in plants, particularly chicory, was considered to degrade at the end of the growing season and during storage, and that the later in the growing season and the longer the storage period, the more the degradation. Furthermore, the art considered that exposure to significant frost damages chicory roots whether still in the field or harvested and stored. Frost damage destroys plant cell structures as a result of which the roots, when defrosted, rapidly rot with degradation of the reserve carbohydrate, inulin. Accordingly, in Northern Europe (the region where chicory is conventionally cultivated), chicory conventionally is seeded at the end of the season with frost (depending from the occurring weather conditions from about March 15 to May 14), and the

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roots are harvested, stored* and processed* (*if not sheltered from frost), preferably and mostly before the roots become exposed to frost.

The present inventors have surprisingly found that temperature conditions which trigger the FEH gene may even occur during a certain period of the growing phase, but that, in order to obtain inulin with a desired high ($\overline{DP}$) (preferably over a long processing period of at least 60 days), the FEH triggering temperature conditions may not occur during a specific period of the growing-harvesting-storage-processing period. This was clearly non-obvious in view of the prior art.

The prior art actually teaches away from seeding chicory and having chicory in a first growing phase possibly exposed to low temperature conditions. Thus, a person skilled in the art would not have any reasonable expectation of success, and would not carry out such studies. Therefore, defining the triggering conditions of the FEH encoding gene upon which the present application is non-obvious in view of the prior art.

Besides, from the prior art it was not obvious at all that chicory could be cultivated (including seeding-growing-harvesting-storing and processing) during other time periods and under other climatological temperature conditions than the ones known from the conventional cultivation of chicory.

Furthermore, as a consequence of the elucidation of the conditions which trigger the FEH activity and thus the degradation of inulin, it has become possible, according to the present claimed invention and clearly non-obvious in view of the prior art, to cultivate chicory with longer growing periods, which in turn results in increased yields of chicory roots and consequently in increased yields of inulin.

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Turning now to the art rejections, and considering first the rejection of independent claim 65 and the several claims 66-78 and 89-97 as obvious from Yamazaki et al. in view of Van Den Ende et al., Yamazaki et al. has been cited as teaching the processing of chicory inulin from chicory roots through conventional manufacturing techniques, and is acknowledged as so teaching. However, the Examiner looks to Van Den Ende et al. to supply the missing teachings.

Yamazaki et al. is completely silent regarding the possibility of cultivating chicory roots for the manufacture of inulin in periods that do not correspond to conventional ones. Yamazaki et al. does not contain any teaching about the possibility or need of cultivating and/or using such source chicory roots for the manufacture of inulin.

Appellants submit that the conventional cultivation of chicory roots, including seeding, growing and harvesting/processing, is clearly excluded from the scope of claim 65. The terms of the claim define through the combination of all the claimed features a particular requirement (seen as a whole) that clearly is not fulfilled by the conventional cultivation of chicory roots, e.g., such as taught by Yamazaki et al.

The subject invention resides in part in the use of a particular source material for the process for the manufacture of inulin, which source material has to fulfill particular requirements resulting from the combination of particular seeding periods, particular lengths of growing periods lengths of periods of harvesting /processing, and particular requirements for temperature conditions during certain, well defined growing and harvesting/processing periods.

The use of such particular source material in the process according to the present claimed invention results in considerable technical advantages, including, for example, improved grades of inulin (Description p.13, lines 10-20 and p.16, lines 6-14) as well as in inter alia an extension

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of the possible growing period and growing season with subsequent technical benefits (e.g. Description, p.24, line 33 to p.25, line 24). Thus, Yamazaki et al. cannot be said to teach or suggest the claimed invention.

In rejecting the claims as obvious from Yamazaki et al. in view of Van Den Ende et al., the Examiner acknowledges that the primary reference Yamazaki et al. fails to teach the claimed periods of seeding/growing/processing which includes no triggering or production of fructan exohydrolase gene in chicory roots (Final Action, page 4, lines 8-9). However, the Examiner takes the position that this missing teaching us supplied by Van Den Ende et al. It is submitted (1) that Van Den Ende et al. does not supply the missing teachings, and (2) that it would not be obvious to one skilled in the art to combine the method of Yamazaki et al. with the method of Van Den Ende et al. in any event.

Compared to the roots used in the process of the present invention, the chicory roots according to Van Den Ende et al. have had a too short growing period (from June 1 till end October), or when the growing period was longer (till December 6th), the roots were subjected to low temperature conditions that triggered FEH activity and resulted in significant degradation of inulin.

Van Den Ende et al. also does not disclose cultivation of chicory roots otherwise than in a conventional manner and in fact teaches away from non-conventional cultivation of chicory roots because it generically teaches that low temperature conditions should be avoided because they provoke degradation of inulin in chicory roots.

On page 5 of the Final Action, the Examiner quotes from Van Den Ende et al.:

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> "The shift from high DP fructans to low DP fructans could be due to the action of FFT using low molecular weight carbohydrates as acceptors..." (page 5, lines 7-9, as quoting from page 48, Col. 2, paragraph 2 of Van Den Ende et al.) (underlining added for emphasis).

Here Van Den Ende et al. at best speculates as to a possible effect of seasonal changes in the biochemistry of fructan storing organs. Clearly the Examiner is employing impermissible hindsight and is applying the teachings of the present invention to make out a case for obviousness. Van Den Ende et al. clearly only relates to conventional cultivation of chicory roots (for Belgian endive production) and does not disclose the possibility to grow chicory roots under other than conventional conditions. Van Den Ende et al. does not give any teaching or incentive at all to the skilled person to cultivate chicory roots (for the manufacture of inulin) otherwise than conventionally.

In the Advisory Action, the Examiner cites for the first time a printout of weather conditions for Brussels, Belgium allegedly to show that growing conditions in Belgium for the time period reported in Van Den Ende et al. did not fall below 1°C. On this basis, the Examiner concludes that the conditions under which Van Den Ende et al. performed his experiment were identical and therefore the products must have been identical. Heverlee, Belgium, which is where Van Den Ende et al. reportedly conducted their experiments is a small rural community (11,000 residents) 14 kilometers west of Brussels. Brussels, on the other hand has a population of almost a million. (**See Appendix B and C**). The Examiner has failed to establish prima facie that the temperature conditions in Heverlee, a small rural community would be the same as the temperature conditions within the metropolitan city or Brussels. Indeed, this Board can take judicial notice that temperatures in the metropolitan city of Brussels were not the same as in the

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outlying area of Heverlee, and likely were higher due to mass of buildings, roadways and heat generating sources.

In rejecting Applicant's claims the Examiner relies on In re Cruciferous Sprout Litigation 64 USPQ 2d 1202 (CAFC 2002) for the proposition that the temperature conditions specified in Appellants' claims were taught by Van Den Ende et al. It is submitted that there is nothing in the record that teaches the temperature conditions (in Heverlee) under which Van Den Ende et al. ran their tests were the same as the claimed temperature conditions within Brussels. Indeed, Appellants submit that the reported temperature conditions within Brussels were not the same in Heverlee. Thus, the resulting product would not be the same. Accordingly, the Examiner's reliance on In re Cruciferous Sprout Litigation is misplaced.

Furthermore, Appellants emphasize that the present claimed invention is not directed to the result of a mere routine optimization of conventional process parameters/conditions. Rather, the present claimed invention relates to non-conventional process parameters/conditions, namely parameters/conditions which are not (implicitly) covered by conventional process parameters/conditions, and in fact are contraindicated by the conventional art. Accordingly, routine optimization of conventional process parameters/conditions could not lead to the process parameters/conditions of the present invention since the conventional prior art would teach against the claimed process conditions.

Moreover, there are numerous other differences not considered by the Examiner. For one, Van Den Ende et al. teaches that towards the end of the growing season SST activity decreases and even stops, which concurs with a decrease and even a cessation of root growth and the inulin synthesis (no new kestose is synthesized). Van Den Ende et al. also teaches that

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towards the end of the growing season and particularly from October 15 onwards (period wherein low temperature conditions/frost occur), inulinase activity appears and sharply increases with time, which results in a rapidly breakdown of inulin, particularly of high DP inulin molecules with formation of fructose and low DP inulin molecules (see e.g. Van Den Ende et al., Summary; see also the paragraph beginning in the middle of the right hand column on p. 47; see also the first and fourth full paragraphs on page 48). Van Den Ende et al. attributes such inulinase activity to the activity of the FEH enzyme, but also to the possible inulinase activity of the FFT enzyme:

> "However, the observed shift from high DP fructans to lower DP fructans could also be (partly) due to the action of FFT using low molecular weight carbohydrates as acceptors."

However, irrespective of the enzyme or enzymes and the mechanism responsible for the decrease of the inulin content and of the DP of the inulin molecules in chicory roots at the end of the growing season, Van Den Ende et al. specifically and unambiguously teaches that low temperature conditions/frost are unfavorable for inulin synthesis in chicory roots and that such conditions activate inulinase activity which results in a cessation of inulin synthesis and even in a considerable breakdown of inulin. Thus, Van Den Ende et al. merely confirms by an academic study of enzyme activities, Appellants' acknowledged prior art (see Description p.8, line 20 to p. 9, line 2), that low temperature/frost conditions which occur at the end of the conventional growing season have an undesirable, inulin degrading effect on chicory roots.

Thus, Van Den Ende et al. does not contain any teaching at all that chicory roots for inulin production may appropriately be seeded, grown and processed under conditions where low temperature conditions/frost can occur. In fact, Van Den Ende et al. teaches that low temperature

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conditions are to be avoided for the cultivation of chicory roots. Conventional chicory cultivation and in particular Van Den Ende et al. thus clearly teach away from seeding /growing chicory under conditions where frost may occur.

Accordingly, the present claimed invention according to which chicory roots source material is seeded /grown/ processed under such conditions that at a certain stage of the seeding/growing period low temperature conditions/frost may occur without causing considerable negative effects (1) on the growth of the chicory roots, or (2) on the inulin synthesis in said chicory roots, or (3) on the final inulin concentration, or (4) on its DP in said roots, is clearly unexpected in view of Van Den Ende et al.

Since Van Den Ende et al. teaches that low temperature conditions/frost during the growth period lead to rapid and considerable inulin breakdown, Van Den Ende et al. clearly does not provide any teaching or suggestion to one skilled in the art to consider growing chicory roots for the manufacture of inulin under such conditions that during the growing period low temperature conditions/frost may occur.

Summarizing to this point, and with specific regard to the disclosure of Van Den Ende et al.:

(1) It was unknown at the filing date of the present patent application whether or not low temperature conditions/frost at the seeding/early stage of the growing period of chicory would impair, or even permanently block SST activity and thus impair or block root growth and inulin synthesis;

(2) It was unknown at the filing date of the present patent application whether or not low temperature conditions/frost at the seeding/early stage of the growing period of chicory would

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trigger inulinase activity (e.g. from FEH and/or FFT and/or any other inulinase) which may result in the presence of a significant inulinase activity in the chicory roots from the early growing period onwards, and result in a strong breakdown effect on inulin molecules already present in the roots;

(3) It was unknown at the filing date of the present patent application whether once inulinase activity was generated or activated in an early stage of the growing period, such inulinase activity would or would not remain active during the further growing period of the roots and accordingly have a baleful effect on inulin synthesis and inulin DP in the chicory roots during the further growing period; and

(4) One skilled in the art, and with the teaching of Van Den Ende et al., could not foresee with a reasonable expectation of success that chicory roots suitable for use as an adequate source material (i.e. with a normal yield of roots and that present a normal content of inulin of normal DP) in the process for the manufacture of inulin according to the present claimed invention, could be seeded/grown partially or wholly outside the conventional period as indicated in Appellants' claims.

(5) The Examiner has not shown prima facie that the temperature conditions under which Van Den Ende et al. conducted their experiments fall within the scope of the claims on Appeal.

Accordingly, the determination of the well-delimited period during which low temperature conditions are allowable according to the present invention is thus not an optimization of conventional conditions, as erroneously indicated by the examiner, but, contrarily, constitutes new, non-conventional process parameters and conditions.

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Having regard to the above, Appellants submit that the subject matter of the present invention is thus clearly unexpected in view of the teaching of Van Den Ende et al. Therefore, the claimed invention has to be considered non-obvious in view of Van Den Ende et al. Accordingly, no combination of Yamazaki et al. and Van Den Ende et al. could achieve the claimed invention, and the skilled person would have no incentive in Yamazaki et al. in combination with Van Den Ende et al. to examine a possible substitution of chicory roots source material that has been conventionally cultivated by non-conventionally cultivated chicory roots source material. The possibility to obtain non-conventionally cultivated chicory roots source material was unknown and unexpected at the filing date of the subject patent application. There was no teaching to the skilled person that said substitution was possible with a reasonable expectation of success. Thus, the Examiner's rejection of the claimed process or its source material as being obvious from Yamazaki et al. in view of Van Den Ende et al. clearly is not taught by the prior art, and is based on hindsight.

Since neither reference teaches the claimed invention, and in fact, teaches against the claimed invention, no combination of Yamasaki et al. and Van Den Ende et al. reasonably could be said to achieve or render obvious the invention as defined by claim 65, or the several claims 66-78 which are dependent directly or indirectly thereon. Thus, the rejection of claim 65 and the several claims 66-78 which depend directly or indirectly on claim 65 is in error.

Claim 89 and the several claims 90-92 which depend directly or indirectly thereon are directed to a process for the manufacture of a partial hydrolysate of chicory inulin, using as a source material chicory roots grown and processed under the conditions defined in claim 65. Claim 93 and claims 94-96 which depend thereon are directed to a process for the manufacture

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of a complete hydrolysate of chicory inulin similarly using as the source material chicory roots grown or processed under the conditions of claim 65. Finally, claim 97 is directed to a process for the manufacture of a derivative of chicory inulin using as the source material chicory roots grown or processed under the conditions defined in claim 65. Since the growing and processing conditions as defined in claim 65 are not taught by the combination of Yamazaki et al. and Van Den Ende et al. as discussed above at length, claims 89-97 also cannot be said to be obvious from Yamazaki et al. and Van Den Ende et al., and the rejection of claims 89-97 is likewise in error.

(2) The rejection of claims 79-88 as obvious from Yamazaki et al. in view of Van Den Ende et al. and further in view of Van Loo is in error.

Claim 79 and the several claims 80-88, which depend directly or indirectly thereon are all directed to a process for the manufacture of high performance grade chicory inulin as defined in the claim using as the source material chicory roots grown and processed under the conditions defined in claim 65. The deficiencies of the combination of Yamazaki et al. and Van Den Ende et al. vis-à-vis claim 65 are discussed above and are incorporated herein by reference.

The Van Loo et al. secondary reference does not supply the missing teachings to Yamazaki et al. and Van Den Ende et al. to achieve or render obvious Appellants' claims. Van Loo et al., which is a prior patent of Smits, one of the named inventors of the subject application, merely relates to inulin that is free of low molecular weight polysaccharides (oligosaccharides) and to a method for the preparation of same. Having regard to the technical problem underlying the present invention, and the technical solution disclosed and claimed in the present patent application, Van Loo et al. merely concerns a preparation of a particular grade of inulin by

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means of a particular process, that starts from standard grade crude or purified inulin! In the present application, claims 79-88 all require a particular source material, i.e., chicory roots grown and processed under the unconventional conditions specified by claim 65. Thus, the rejection of claims 79-88 as obvious from Yamazaki et al. and Van Den Ende et al. in view of Van Loo et al. also is in error.

SUMMARY AND CONCLUSIONS

The prior art in general, and applied prior art references in particular, neither teach nor suggest which enzyme is mainly responsible for the degradation of inulin in chicory roots at the end of the growing season and during storage and processing to inulin, nor even more importantly what conditions trigger the production of the enzyme and/or the pronounced FEH activity of the enzyme. The applied prior art also neither teaches nor suggests any possibility nor any means of excluding the triggering of the production and/or the activity of said FEH enzyme. Thus, no combination of the applied art could achieve or render obvious the claimed invention.

In view of the prior art, it was also clearly non-obvious to obtain by the process of the present invention inulin with a higher mean ($\overline{DP}$) over a long (at least 60 days) storage and processing period than the one of conventional inulin. Indeed, the prior art teaches away from the claimed invention in this respect, because prior to the present invention, the conventional wisdom of the state of the art was that at the end of the growing period, the ($\overline{DP}$) drops and that thus the chicory roots have to be processed as soon as possible.

Furthermore, considering the long felt need for industrial quantities of inulin product with an improved ($\overline{DP}$) and considering the long period the industry has already had, and failed, to

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solve this need by means including complicated processing methods as well as biotechnological techniques, it is respectfully submitted that the present claimed invention is non-obvious, and that the rejection of the claims is in error.

In view of the foregoing, it is respectfully requested that the Examiner's Rejection of the subject Application be reversed in all respects.

Respectfully submitted,

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CERTIFICATE OF MAILING

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

IN RE APPLN. OF: SMITS et al.

SERIAL NO.: 09/600,732

FILED: July 20, 2000

FOR: PROCESS FOR THE MANUFACTURE OF CHICORY. . .

GROUP: 1637

EXAMINER: SURYAPRABHA CHUNDURU DOCKET: TIENSE RAFF.26

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APPELLANTS' BRIEF ON APPEAL

APPENDIX A

(Claims on Appeal)

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APPENDIX A

CLAIMS ON APPEAL

Claim 65: In a process for the manufacture of chicory inulin from chicory roots through conventional manufacturing techniques, the improvement which comprises:

- using as a source material for the process roots of chicory which have been grown in appropriate regions and have been seeded, grown and processed under climatological temperature conditions which are such that during a period of at least from the beginning of the third month of the growing period till the end of the processing of the chicory roots the fructan exohydrolase (FEH) gene in the chicory roots has not been triggered by the occurrence of low temperature conditions which are such that the temperature in a thermometer shelter shall not have dropped below minus 1°C,
- said chicory roots have had a growing period of at least 150 days,
- said chicory has been seeded
  - in the northern hemisphere within a period selected from the periods ranging from December 1 till March 14, from March 15 till May 14, from May 15 till May 31, from June 1 till June 14, and from June 15 till November 30, provided that when said chicory has been seeded in the periods from May 15 till May 31, and from June 1 till June 14, the chicory roots have had a growing period of at least 180 days, and provided that when said chicory has been seeded in the period from March 15 till May 14, the chicory roots have been grown and processed under climatological conditions wherein, within a period of at least 220 consecutive days immediately preceding the end of the processing of the roots, no low temperature

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conditions occurred which triggered the FEH gene, and the chicory roots have had a minimum growing period of at least 160 days,

- in the southern hemisphere within a period selected from the periods ranging from June 1 till September 14, from September 15 till September 30, from October 1 till November 14, from November 15 till November 30, and from December 1 till May 31.

Claim 66: In a process according to claim 65, the improvement wherein the chicory has had a growing period of at least 180 days.

Claim 67: In a process according to claim 65, the improvement wherein the chicory has been seeded in the northern hemisphere.

Claim 68: In a process according to claim 65, the improvement wherein the roots of chicory have been grown and processed under climatological temperature conditions wherein, within a period of at least 220 consecutive days immediately preceding the end of the processing of the roots, no low temperature conditions occurred which triggered the FEH gene in chicory roots, said roots have had a growing period of at least 160 days, and the inulin obtained is improved standard grade chicory inulin with a mean average degree of polymerization ($\overline{DP}$) taken over a processing period of at least 60 days, which is at least 12.

Claim 69: In a process according to claim 68, the improvement wherein no low temperature conditions which trigger the FEH gene in chicory roots occur within a total period of at least 240 consecutive days and the chicory has had a growing period of at least 180 days.

Claim 70: In a process according to claim 69, the improvement wherein the chicory has been seeded in the northern hemisphere within a period selected from the periods ranging from December 1 till March 14, from March 15 till May 14, from May 15 till May 31, and from June

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1 till November 30, or in the southern hemisphere within a period selected from the periods ranging from June 1 till September 14, from September 15 till November 14, from November 15 till November 30, and from December 1 till May 31.

Claim 71: (Cancelled - After Final Amendment)

Claim 72: In a process according to claim 65, the improvement wherein said appropriate regions comprise the Californian region of the USA.

Claim 73: In a process according to claim 65, the improvement wherein the source material are chicory roots which have been grown and processed under the conditions as defined in claim 65, said process further comprising the steps of:

(i) isolation of the inulin from the chicory roots yielding an aqueous solution of crude inulin,

(ii) purification of the crude inulin obtained in step (i) yielding an aqueous solution of purified inulin, optionally followed by concentration of this solution by partial removal of the water yielding a purified inulin concentrate, and

(iii) isolation in particulate form of the inulin from the aqueous solution or concentrate of purified inulin obtained in step (ii), thereby yielding, respectively, standard grade chicory inulin or improved standard grade chicory inulin.

Claim 74: In a process according to claim 73, the improvement comprising:

- for step (i): extraction with hot water of the inulin from fresh slices or shreds of the chicory roots, yielding an aqueous solution of crude inulin,
- for step (ii): purification of the aqueous solution of crude inulin obtained in step (i) by depuration followed by refining, and

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- for step (iii): isolation of, respectively, standard grade chicory inulin or improved standard grade chicory inulin, in particulate form by spray drying.

Claim 75: In a process according to claim 65, for the manufacture of low sugar standard grade chicory inulin or improved low sugar standard grade chicory inulin containing in total less than 1 weight % monomeric saccharides and sucrose, by conventional techniques from chicory roots, the improvement wherein the source material are chicory roots which have been grown and processed under the conditions as defined in claim 65.

Claim 76: In a process according to claim 75, the improvement wherein, respectively, standard grade chicory inulin or improved standard grade chicory inulin or a corresponding intermediate purified inulin, obtained by a process defined in claim 65 is used as a source material and is, in accordance with known techniques, subjected to the following additional consecutive steps:

(iv) removal of the monomeric saccharides and sucrose, yielding a low sugar inulin solution or concentrate, and

(v) isolating the low sugar inulin in particulate form from the solution or concentrate obtained in step (iv),

and the product obtained is, respectively, low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 10 or improved low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 12, the mean ($\overline{DP}$) being taken over a processing period of at least 60 days.

Claim 77: In a process according to claim 75, the improvement wherein, respectively, standard grade chicory inulin or improved standard grade chicory inulin or a corresponding

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intermediate purified inulin, obtained by a process defined in claim 68 is used as a source material and is, in accordance with known techniques, subjected to the following additional consecutive steps:

(iv) removal of the monomeric saccharides and sucrose, yielding a low sugar inulin solution or concentrate, and

(v) isolating the low sugar inulin in particulate form from the solution or concentrate obtained in step (iv),

and the product obtained is, respectively, low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 10 or improved low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 12, the mean ($\overline{DP}$) being taken over a processing period of at least 60 days.

Claim 78: In a process according to claim 75, the improvement wherein, respectively, standard grade chicory inulin or improved standard grade chicory inulin or a corresponding intermediate purified inulin, obtained by a process defined in claim 74 is used as a source material and is, in accordance with known techniques, subjected to the following additional consecutive steps:

(iv) removal of the monomeric saccharides and sucrose, yielding a low sugar inulin solution or concentrate, and

(v) isolating the low sugar inulin in particulate form from the solution or concentrate obtained in step (iv),

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and the product obtained is, respectively, low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 10 or improved low sugar standard grade chicory inulin with a mean ($\overline{DP}$) of at least 12, the mean ($\overline{DP}$) being taken over a processing period of at least 60 days.

Claim 79: In a process according to claim 65, for the manufacture of high performance grade chicory inulin with a ($\overline{DP}$) of at least 20, or improved high performance grade chicory inulin with a mean ($\overline{DP}$), taken over a processing period of the chicory roots of at least 60 days, of at least 20, which are essentially free from low molecular monomeric saccharides, dimeric saccharides and oligofructose, and essentially free from colorings, salts, proteins, organic acids and technological aids, the improvement wherein the source material are chicory roots which have been grown and processed under the conditions as defined in claim 65.

Claim 80: In a process according to claim 79, the improvement wherein standard grade chicory inulin with a ($\overline{DP}$) of at least 12, respectively improved standard grade chicory inulin with a mean ($\overline{DP}$), taken over a processing period of the chicory roots of at least 60 days, of at least 12, or its intermediate, depurated or refined inulin, obtained by a process defined in claim 65, is used as a source material and subjected, in accordance with known techniques, to the following consecutive steps:

(vi) fractionation, and

(vii) isolation in particulate form of the high performance grade inulin from the fractionated product obtained in step (vi),

thereby providing high performance grade chicory inulin, respectively improved high performance grade chicory inulin in a yield of at least 40% based on the source inulin.

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Claim 81: In a process according to claim 80, the improvement wherein standard grade chicory inulin with a ($\overline{DP}$) of at least 12, respectively improved standard grade chicory inulin with a mean ($\overline{DP}$), taken over a processing period of the chicory roots of at least 60 days, of at least 12, or its intermediate, depurated or refined inulin, obtained by a process defined in claim 73, is used as a source material and subjected, in accordance with known techniques, to the following consecutive steps:

(vi) fractionation, and

(vii) isolation in particulate form of the high performance grade inulin from the fractionated product obtained in step (vi),

thereby providing high performance grade chicory inulin, respectively improved high performance grade chicory inulin in a yield of at least 40% based on the source inulin.

Claim 82: In a process according to claim 80, the improvement wherein standard grade chicory inulin with a ($\overline{DP}$) of at least 12, respectively improved standard grade chicory inulin with a mean ($\overline{DP}$), taken over a processing period of the chicory roots of at least 60 days, of at least 12, or its intermediate, depurated or refined inulin, obtained by a process defined in claim 74, is used as a source material and subjected, in accordance with known techniques, to the following consecutive steps:

(vi) fractionation, and

(vii) isolation in particulate form of the high performance grade inulin from the fractionated product obtained in step (vi),

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thereby providing high performance grade chicory inulin, respectively improved high performance grade chicory inulin in a yield of at least 40% based on the source inulin.

Claim 83: In a process according to claim 80, the improvement wherein the fractionation is carried out by directed crystallization of an aqueous metastable solution of the source material, and the isolation of the fractionated inulin in particulate form is carried out by filtration or centrifuging including washing with water.

Claim 84: In a process according to claim 81, the improvement wherein the fractionation is carried out by directed crystallization of an aqueous metastable solution of the source material, and the isolation of the fractionated inulin in particulate form is carried out by filtration or centrifuging including washing with water.

Claim 85: In a process according to claim 82, the improvement wherein the fractionation is carried out by directed crystallization of an aqueous metastable solution of the source material, and the isolation of the fractionated inulin in particulate form is carried out by filtration or centrifuging including washing with water.

Claim 86: In a process according to claim 80, the improvement wherein the source inulin has a ($\overline{DP}$), respectively a mean ($\overline{DP}$) of at least 14, and the high performance grade chicory inulin, respectively improved high performance grade chicory inulin, is obtained in a yield of at least 45% based on the source material, and has a ($\overline{DP}$), respectively a mean ($\overline{DP}$), of at least 20, the mean ($\overline{DP}$) being taken over a processing period of the source chicory roots of at least 60 days.

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Claim 87: In a process according to claim 81, the improvement wherein the source inulin has a ($\overline{DP}$), respectively a mean ($\overline{DP}$) of at least 14, and the high performance grade chicory inulin, respectively improved high performance grade chicory inulin, is obtained in a yield of at least 45% based on the source material, and has a ($\overline{DP}$), respectively a mean ($\overline{DP}$), of at least 20, the mean ($\overline{DP}$) being taken over a processing period of the source chicory roots of at least 60 days.

Claim 88: In a process according to claim 82, the improvement wherein the source inulin has a ($\overline{DP}$), respectively a mean ($\overline{DP}$) of at least 14, and the high performance grade chicory inulin, respectively improved high performance grade chicory inulin, is obtained in a yield of at least 45% based on the source material, and has a ($\overline{DP}$), respectively a mean ($\overline{DP}$), of at least 20, the mean ($\overline{DP}$) being taken over a processing period of the source chicory roots of at least 60 days.

Claim 89: In a process for the manufacture of a partial hydrolysate of chicory inulin, by conventional techniques from chicory roots, the improvement wherein the source material are chicory roots which have been grown and processed under the conditions as defined in claim 65 and the product obtained is polydisperse oligofructose.

Claim 90: In a process according to claim 89, the improvement wherein respectively, standard grade or improved standard grade chicory inulin or the corresponding intermediates, depurated or refined inulin, obtained by a process defined in claim 65, is used as a source material, and the product obtained is polydisperse oligofructose containing at least 90% by weight dry substance and the oligofructose has a degree of polymerization (*DP*) from 2 to 10.

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Claim 91: In a process according to claim 90, the improvement wherein respectively, standard grade or improved standard grade chicory inulin or the corresponding intermediates, depurated or refined inulin, obtained by a process defined in claim 73, is used as a source material, and the product obtained is polydisperse oligofructose containing at least 90% by weight dry substance and the oligofructose has a (*DP*) from 2 to 10.

Claim 92: In a process according to claim 90, the improvement wherein respectively, standard grade or improved standard grade chicory inulin or the corresponding intermediates, depurated or refined inulin, obtained by a process defined in claim 74, is used as a source material, and the product obtained is polydisperse oligofructose containing at least 90% by weight dry substance and the oligofructose has a (*DP*) from 2 to 10.

Claim 93: In a process for the manufacture of a complete hydrolysate of chicory inulin, by conventional techniques from chicory roots, the improvement wherein the source material are chicory roots which have been grown and processed under the conditions as defined in claim 65, and the product obtained is fructose.

Claim 94: In a process according to claim 93, the improvement wherein, respectively, standard grade or improved standard grade inulin or the corresponding intermediate, depurated or refined inulin, obtained by a process defined in claim 65, is used as a source material, and the product obtained is fructose containing at least 89% by weight fructose, calculated on dry substance.

Claim 95: In a process according to claim 93, the improvement wherein, respectively, standard grade or improved standard grade inulin or the corresponding intermediate, depurated or refined inulin, obtained by a process defined in claim 73, is used as a source material, and

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the product obtained is fructose containing at least 89% by weight fructose, calculated on dry substance.

Claim 96: In a process according to claim 93, the improvement wherein, respectively, standard grade or improved standard grade inulin or the corresponding intermediate, depurated or refined inulin, obtained by a process defined in claim 74, is used as a source material, and the product obtained is fructose containing at least 89% by weight fructose, calculated on dry substance.

Claim 97: In a process for the manufacture of a derivative of chicory inulin, by conventional techniques from chicory inulin or an intermediate thereof, the improvement wherein the source material for the inulin are chicory roots which have been grown and processed under the conditions as defined in claim 65.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

IN RE APPLN. OF: SMITS et al.

SERIAL NO.: 09/600,732

FILED: July 20, 2000

FOR: PROCESS FOR THE MANUFACTURE OF CHICORY. . .

GROUP: 1637

EXAMINER: SURYAPRABHA CHUNDURU DOCKET: TIENSE RAFF.26

MAIL STOP APPEAL BRIEF - PATENTS
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APPELLANTS' BRIEF ON APPEAL

APPENDIX B

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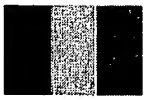

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Belgium at a glance

(Last updated in September 2003)

Name:	Kingdom of Belgium, Koninkrijk België, Royaume de Belgique
Climate:	Temperate climate
Location:	Western Europe, bounded south-west by France, north-west by the Nor the Netherlands, east by Germany and south-east by Luxembourg
Area:	30,528 sq km (by comparison, area of North-Rhine/Westphalia: 34,078
Capital:	Brussels
Population:	10,239,085 inhabitants; 5,940,488 in the Flemish region, 3,339,279 in the Walloon region (inclu German-speaking region), 959,318 in Brussels, 872,765 foreigners; population density: 335.4 per sq km, population growth: +2.01% (200
Languages:	Flemish (approx. 6.1 million), French (approx. 4.1 million), German (approx. 0.07 million)
Religions:	Approx. 8 million Roman Catholics, 75,000 Protestants, 40,000 Orthodo approx. 400,000 Muslims, 35,000 Jews, 1.7 million not belonging to an
National Day:	21 July (coronation of the first King of the Belgians, Leopold I)
Independence:	1830
System of government:	Constitutional monarchy, parliamentary two-chamber system, federal s
Head of State:	(Succession in the House of Saxe-Coburg-Gotha) Albert II, King of the Belgians, Koning der Belgen, Roi des Belges, since 9 August 1993; Deputy: none ex officio
Head of Government:	Prime Minister Guy Verhofstadt (VLD), since 12 July 1999
Foreign Minister:	Louis Michel (PRL), since 12 July 1999
Parliament:	Based in Brussels, President: Herman De Croo (VLD), name: Chamber of Representatives (Chambre des Représentants, Kam Volksvertegenwoordigers); 150 members; last election on 18 May 2003 2007; functions: general legislation, budget, oversight of government

Senate:	Based in Brussels, President: Armand De Decker (PRL), name: Senate (Senat, Senaat), 71 members, last election (of 40 senat 2003, next election in 2007; the other members are co-opted or design councils; functions: participation in constitutional amendments, ratification of int and right of second reading; otherwise consultative
Governing parties:	Listed according to number of seats in the Chamber of Representatives 1. Vlaamse Liberalen en Demokraten (VLD - Flemish Liberals) 25 2. Parti Socialiste (PS - Francophone Socialists) 25 3. Mouvement Réformateur (MR - Francophone Liberals) 24 4. Sociaal Progressief Alternatief (SPA-Spirit - Flemish Socialists) 23
Opposition parties:	Listed according to number of seats in the Chamber of Representatives 1. Christen-Democratisch en Vlaams (CD&V - Flemish Christian Democ 2. Vlaams Blok (VB - Flemish right-wing extremists) 18 3. Centre démocratique humaniste (CDH - Francophone Christian Dem 4. Ecologistes confédérés (Ecolo - Francophone Greens) 4 5. Front National (FN - Francophone right-wing extremists) 1 6. Nieuw-Vlaamse Alliantie (N-VA) (Nationalist Flemish Language Party)
Trade unions:	Listed according to number of members in works councils: Confédération des Syndicats Chrétiens de Belgique (CSC) = Algemeen Christelijk Vakverbond van België (ACV, Christian), Fédération Générale du Travail de Belgique (FGTB) = Algemeen Belgisch Vakverbond (ABVV, socialist), Centrale Générale des Syndicats Libéraux de Belgique (CGSLB) = Algemeene Centrale der Liberale Vakbonden van België (ACLVB, liberal)
Administrative structure:	Belgium consists of the Federation and the regions of Flanders, Walloni region Brussels, and of the Flemish, French and German-language com Intermediate tier: 10 provinces with governors Lower tier: 589 local communities
Membership of international organizations:	BENELUX, BITD, EBRD, ECE, EEA, ESA, EU, EUROCONTROL, Council of ICAO, IIFC, IIT, ILO, IMCO, IMF, NATO, OAU, OECD, OSCE, UNESCO, U Bank, WEU, WHO, WMO, WTO (as a rule from the very beginning)
Principal media:	*Public radio and television*: - VRT - Vlaamse Radio en Televisie - RTBF - Radio-Télévision Belge de la Communauté Française - BRF - Belgian Broadcasting Corporation *Commercial radio and television*: - RTL-TVI (French) - VTM - Vlaamse Televisie Maatschappij (Dutch) - Kanaal 2 (Dutch) - VT 4 (Dutch) Cable companies broadcast some German programmes. *Print media*: Flemish: Het Laatste Nieuws (Brussels, national), liberal De Standaard (Brussels, national), Christian, conservative De Morgen (Brussels, national), left (intellectual) Gazet van Antwerpen (regional), Christian Het Volk (Brussels, national), Christian Democratic Het Belang van Limburg (Hasselt), Christian French: Le Soir (Brussels, national), liberal La Libre Belgique (Brussels, national), Christian, conservative Vers L'Avenir (Namur), Christian German: Grenzecho (Eupen); German, daily *Economic papers:* Flemish: Financieel Economische Tijd (Brussels, national) French: L'Echo (Brussels, national) *Magazines*:

	Flemish: Knack (Brussels, national), liberal French: Le Vif/L'Express (Brussels, national), liberal German: Belgien-Magazin (Brussels)
GDP:	EUR 264.73 billion
Per-capita GDP:	EUR 25,966

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APPELLANTS' BRIEF ON APPEAL

APPENDIX C

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Location: *Oud-Heverlee Belgium* | Category: *Belgium Cities and Towns*

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Oud-Heverlee Belgium

Oud-Heverlee, a commune with 11,000 residents, is located 14 kilometers west ofBrussels on the E40 roadway.

Blanden, Haasrode, Sint-Joris-Weert, and Vaalbeek are boroughs within the municipal district of Oud-Heverlee.

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